

August 3, 2000

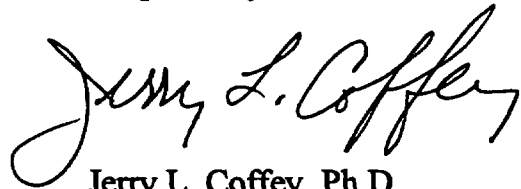
John H. Thompson
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Sir:

This comment and attachments are submitted in response to notices contained in Parts IV and V of the Federal Register of June 20, 2000.

Copies of these materials have also been provided to staff of the Subcommittee on the Census of the Committee on Government Reform of the United States House of Representatives and to other persons who have requested my views or otherwise expressed an interest in these issues.

Respectfully submitted,

A handwritten signature in black ink, reading "Jerry L. Coffey". The signature is fluid and cursive, with the first name "Jerry" being more prominent and the last name "Coffey" following in a similar style.

Jerry L. Coffey, Ph.D.
Mathematical Statistician

**Comments of Jerry L. Coffey
on notices published in the Federal Register of June 20, 2000 by the Commerce Department**

My name is Dr. Jerry L. Coffey, and I am a consultant in Mathematical Statistics. For nearly twenty years I was employed by the Office of Management and Budget (Office of Information and Regulatory Affairs), where I was the senior mathematical statistician in the Executive Office of the President and principle reviewer of the methodologies used by the Census Bureau and other agencies (both statistical and program agencies). Since my retirement from OMB in 1997, I have been a formal (paid) advisor to litigants, Members of Congress, and staff of the Legislative branch, and an informal advisor to other persons and organizations with an interest in the methods and policies of various statistical agencies, including the Census Bureau. I am aware that other commentators will address serious legal questions raised by this proposal and therefore I will confine my comments to the technical problems that have been improperly swept aside in this action.

The finding of the Census Bureau with regard to the technical feasibility of improving the accuracy of the 2000 enumeration by means of synthetic adjustments is substantially flawed. This finding is inaccurate, inconsistent, and misleading. The purpose of this comment is to bring to the attention of the Commerce Department certain misrepresentations furthered by the Census Bureau document published as Part V of the Federal Register of June 20, 2000, and the evidence, well known to the Census Bureau, that not only contradicts their finding, but makes such a finding logically inadmissible to any objective professional statistician.

The Federal Register notice at page 38382 states that --

"The Census Bureau and leading professional statistical organizations have concluded that the best way to address the persistent problems of the undercount and the differential undercount is to complement traditional enumeration procedures with scientific sampling, using DSE."

This statement is false.

Later in the document (page 38385) there is an apparent attempt to back up this statement by reference to many organizations that have had something to say about these issues, including: 1) three NAS panels that issued reports during the 1990s, 2) the American Statistical Association, 3) the American Sociological Association, 4) GAO, 5) the Inspector General of the Commerce Department, and 6) various "advisory" groups established by the Commerce Department and/or the Census Bureau.

Of these groups, only the American Statistical Association qualifies as a "leading professional statistical organization". The advisory groups were or are ad hoc organizations created to assist the Census Bureau and funded from the Census Bureau's budget. Sadly the same is true of the National Academy of Science panels, and the majority of the panel members were not statisticians by profession (though many were from professions that are heavy users of statistics such as economics, sociology and psychology). This leaves only the GAO, the IG, and the two

professional organizations. While GAO, the IG, and the American Sociological Association are independent and highly professional, they are not "professional statistical" organizations.

Kenneth Darga has addressed the false front of "prominent endorsements" in his forthcoming book entitled -- "Fixing the Census Until It Breaks". I have attached a copy of the Appendix to that manuscript entitled "Some Reflections on Science, Politics, and the Census." This pre-production draft is provided with the permission of the author and with the understanding that some error corrections or minor changes may be made prior to the first printing. The statement on page 38385 (which is a general endorsement of sampling) is a fair paraphrase of the position taken by the American Statistical Association, but Darga's paraphrase is clearer --

An endorsement of "sampling" does not necessarily imply endorsement of every possible methodology that uses sampling techniques. In fact, formal statements of the American Statistical Association have specifically stopped short of endorsing the Census Bureau's adjustment methodology [at this point there is a footnote citing language from the ASA Amicus Curiae brief of April 6, 1998 including the following: "ASA also takes no position in this brief on any proposed use of statistical sampling in the 2000 Census..."]. A possible reason for this circumspection is that several members and former officers of the ASA have been prominent critics of the current approach [at this point another footnote provides a list of some of the critics, including three Presidents of the Institute of Mathematical Statistics (IMS), two Presidents of the ASA, two other officers of the ASA, two fellows of the IMS, four fellows of the ASA, and seven fellows of both the ASA and IMS].

[quote above is from Darga, "Fixing the Census Until It Breaks" pp. 312-313]

It is notable that the list of (professional statistical) critics cited in Darga exceeds the number of actual statisticians in all the NAS panels combined. One obvious conclusion from the long history of advisory groups described in the notice is that the likelihood of supporting the preferred Census Bureau policy is related to the selection and/or funding of advisors by the Census Bureau. It is possible that this association is spurious, but I note that it appears to be stronger than any association between factors built into the ACE (the post-strata) and the actual undercount.

What are the actual characteristics of the undercounted?

The Census Bureau document notes that we have known about the undercount since 1940 and that there are decades of evidence from demographic analysis that there is a higher differential undercount for the Black population. But this is only part of what we know. What demographic analysis tells us with no significant doubt is that the undercount is made up predominantly of a minority of adult males (particularly adult Black males) who avoid the enumeration AND the sampling process intended to correct the count by means of dual system estimation (DSE). The size of this effect can be judged from Figures 1 and 2 of the attached 1997 paper by Dr. William R. Bell (Statistical Research Division, Bureau of the Census). These figures compare sex ratios

that are observed in 1) the enumeration, 2) the PES (the 1990 sample survey that is being replaced by the ACE in 2000), and 3) demographic analysis (DA). Note that the PES sample reflects the sex ratios of the population ALREADY counted in the enumeration rather than the effect of the uncounted on sex ratios demonstrated so spectacularly by DA.

The paper is reproduced here without the knowledge or permission of the Census Bureau or Dr. Bell -- in fact, the bibliography provided by the Census Bureau does not even acknowledge the existence of this paper. One might wonder why so important and striking a characteristic of the undercounted is omitted from the description provided by the Census Bureau. Unlike the sample used for dual system estimation, demographic analysis is truly independent of the count, thus avoiding many of the potential biases of DSE. Further, sex ratios are considered to be one of the most solid and reliable measures provided by DA. As it happens, most of the other characteristics attributed to the undercounted (e.g., the excess of renters and the huge error among children) are products of the biased DSE system rather than DA, and some of these are in fundamental conflict with the facts discovered by DA.

One problem that all of the estimation models share is that they use up all the data without producing a unique solution (this is the "saturation" issue discussed on page 3 of Bell [1997]). The capriciousness this engenders was observed by Barbara Bailor in the 1980 experiments where the Bureau produced estimates based on 12 different sets of assumptions -- the estimates of undercount in percent from highest to lowest were 2.0, 1.7, 1.6, 1.6, 1.4, 1.3, 1.0, 0.8, 0.2, then -0.3, -1.0, and -1.1 (these last three were estimated overcounts). As Bailor reported delicately -- "Because all 12 sets were based on assumptions that could not be verified, the Census Bureau was not able choose among them." It was not so much that the 1980 estimates "were flawed by missing and inaccurate data" but this arbitrariness of the results that made adjustment unconscionable. It happened again in 1990. At a February public meeting of the NAS panel charged with evaluating the 2000 Census, Professor Phillip Stark commented on "the ad hoc decisions [required in 1990] to implement the [DSE] algorithm" as follows: "If you had distributed these cases (where there was insufficient information to determine match status) as adversely as possible, you could have gotten an estimated undercount of 9 million -- and if you had distributed them as favorably as possible, you could have gotten an estimated overcount of a million."

This is the dilemma faced by Bell in his 1997 paper -- how to force the erratic dual system estimates to be consistent with the indisputable facts revealed by DA. The Bell paper refers also to work by Little and Elliott to solve this dilemma (that paper has since been published and demonstrates the fragility of the DSE methodology). The constraints adopted by Little and Elliott to force a solution are also discussed in Bell [1997]. Note that the fourth constraint is that the assumptions required for the DSE methodology must hold (even though so friendly an authority as Stephen Fienberg admits that -- "None of the assumptions in any of the basic methodology is satisfied..." [statement at the same February public meeting cited above]. To his credit, Bell acknowledges -- "I am cautious about [constraint] 4, given its HIGHLY SUBJECTIVE NATURE [emphasis added]."

But Bell's justified reservations about forcing the DSE methodology on the country once more are not the only reason this paper didn't make the Census Bureau bibliography. The more important reason is probably the issue of "negative cells" discussed on page 6 of Bell [1997]. Bell's disclosure that about 1/3 of the 1990 PES poststratum 2x2 tables contained negative cells was nothing short of shocking. It is unlikely that this particular characteristic of the DSE model was made known to any of the NAS panels that reviewed adjustment methods [even economists, sociologists and psychologists would have become suspicious of a model that required large numbers of "negative persons" to make its calculations work]. At the February 2000 meeting of the current NAS panel reviewing the census, DSE apologist Stephen Fienberg implied that anomalies that appeared in an analysis by the Census Monitoring Board (Congressional), the same ones acknowledged in Bell [1997], were somehow due to analytical errors made by CMBC staff. Fienberg's reaction reinforces the impression that this pathological behavior of the Census Bureau's own DSE calculations was withheld from previous NAS panels who were being asked to endorse the method.

Finally we come to the critical question on which technical feasibility hangs -- will adjustments based on the DSE calculations improve the accuracy of the count or simply add more bias? Sadly the answer is that they will only add more bias.

Once again we have Dr. Bell to thank for a critical piece of the puzzle. In his valiant efforts to restore consistency with the facts revealed by demographic analysis, Bell became involved in efforts to build a corrected population total for 1990 against which to test DSE post-stratification variables for the 2000 ACE. These efforts were documented in a series of memos submitted to the NAS panel that met in February 2000. To perform this analysis, "targets" were developed that corrected the anomalous sex ratios measured by DA that characterized the undercounted population. When these targets were calculated, the first thing that happened was that (not surprisingly) most of the undercount disappeared. But then when the preferred post-stratification variables were analyzed with respect to these more accurate totals, the relationships touted by the Bureau were swallowed up in a sea of noise. Relative to the totals consistent with the results of demographic analysis, all the DSE-based characteristics trumpeted by the Bureau as descriptive of the undercounted population turn out to be indistinguishable from bias.

But rather than admit that the output of the 1990 DSE estimation process was almost pure bias when measured against the facts provided by demographic analysis, the Census Bureau fine-tuned the 2000 DSE variables to approximate as closely as possible the pattern of bias produced by the 1990 DSE process. So now the Census Bureau is betting that it can "accurately" reproduce the same pattern of bias observed in the 1990 version of DSE and that the public will be none the wiser. This kind of "accuracy" is an unworthy undertaking for an agency with the long and storied history of the Census Bureau.

One final note.

There are other issues that should have been addressed by the Census Bureau but have not been. One of these concerns direct political biases injected into the adjustment process due to (perhaps) well-intentioned but imprudent decisions by Census Bureau statisticians. In the Bureau's rush to demonstrate the feasibility of their adjustment scheme, they have discounted substantial biases on the dangerous premise that such biases move the result in the "right direction" (the Fienberg argument). While these well-intentioned statisticians were suppressing their professional scruples with respect to these "favorable" demographic biases, the "bias-friendly" evaluation procedure opened the door to (perhaps unrecognized) blatant political bias in the adjustment process. Statements made by the Director of the Census Bureau imply that the Bureau is not aware of this serious problem even though one such bias has already been identified and documented outside the Bureau.

Attachments:

"Combining Demographic Analysis (DA) and ICM Results--An Overview" by William R. Bell

(10 pp)

"Appendix B: Some Reflections on Science, Politics, and the Census" excerpted from a prepublication draft of "Fixing the Census Until It Breaks" by Kenneth Darga

(23 pp)

With his comments on the Proposed Rule, Mr. Jerry L. Coffey referenced and enclosed the following:

Enclosure 1: **File Name:** [Coffey - 1](#)

A Research Paper entitled:

"Combining Demographic Analysis (DA) and ICM Results-An Overview"

written by:

William R. Bell, Statistical Research Division, Bureau of the Census,
October 29, 1997

Enclosure 2: **File Name:** [Coffey - 2](#)

Appendix B from:

"Fixing the Census Until It Breaks"

written by:

Kenneth Darga, State of Michigan

These files may be viewed or downloaded through your web browser.